NAVSEA
WARFARE CENTERS
Carderock

Command Overview

CAPT Rich Blank
Commanding Officer, NSWCCD

Dr. Joseph T. (Tim) Arcano, Jr.
Technical Director, NSWCCD

Carderock Division…

We envision the future Fleet, create it, and help sustain it. Carderock – where the Fleet begins.

Carderock has pushed the envelope in naval science and technology for more than 100 years…

…it all starts with an idea.

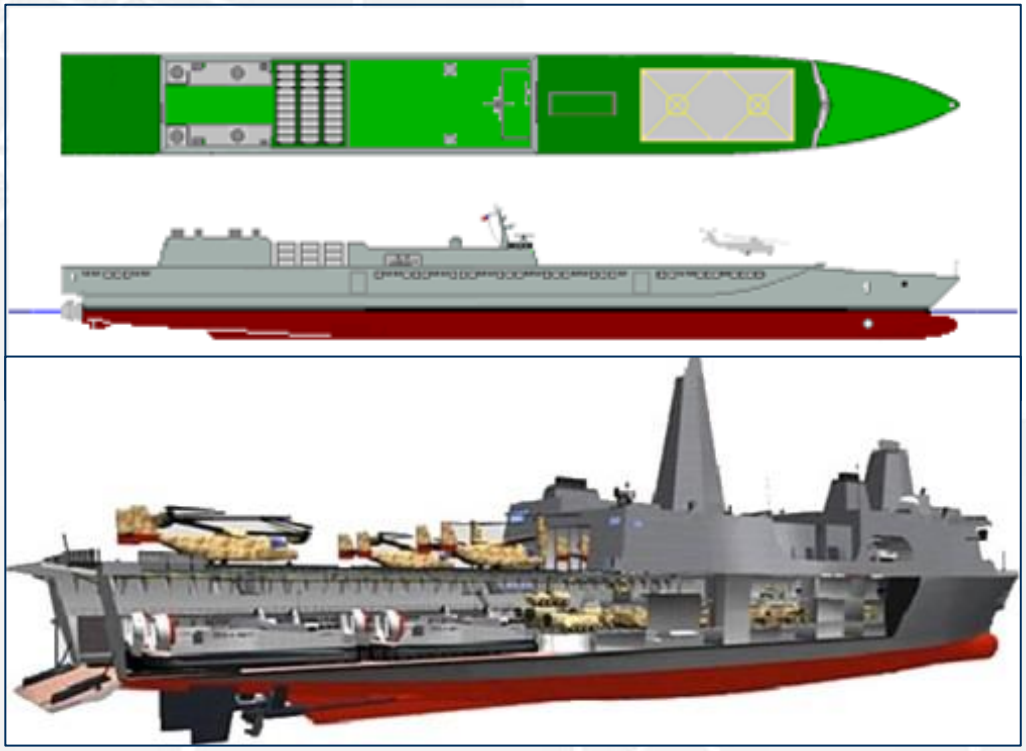
Mission & Vision

NAVSEA WARFARE CENTERS Carderock

Mission:

To provide full-spectrum research and development, test and evaluation, analyses, acquisition, and fleet support for the Navy's ships, ship systems and associated Navy logistics systems.

- Providing technical capabilities for surface / undersea vehicles and associated systems
- Developing and applying S&T associated with naval architecture / marine engineering
- Supporting the maritime industry



Vision:

To be the Navy's trusted partner for identifying and providing world-class, innovative, and cost-effective solutions for advanced ship and ship systems, for providing technical solutions to the warfighter and to keep our Fleet at sea.

Strategic Alignment

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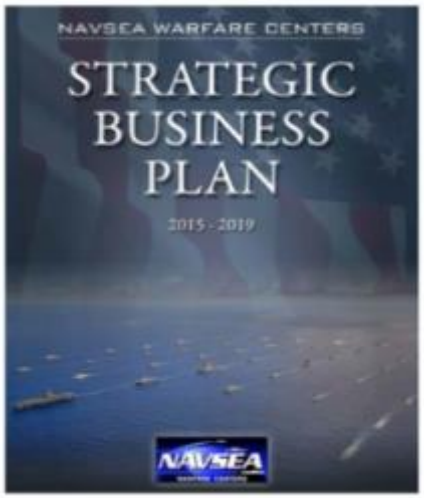

- Execute with excellence
- Shape and maintain technical and business capabilities
- Drive a culture of affordability
- Continuously build and shape a capable workforce
- Increase cybersecurity in Warfare Center products and processes

Science and Technology

Research and Development

Design and Requirements

Program Office Support

Fleet Training and Simulation

Modernization & Lifecycle Support

Test and Evaluation

Prototyping

Creating Tomorrow's Fleet

CARDEROCK Strategic Focus Areas

Workforce Retention & Development

Surface Ship Design

Submarine Design

Ship Design Tools

Advanced Signatures

Cybersecurity

Rapid Prototyping & Experimentation

Power and Energy

Unmanned Systems

Additive Manufacturing

Collaborating across NAVSEA, Warfare Center divisions and the Naval Research and Development Establishment (NR&DE) to place innovative solutions in the hands of the Fleet

Warfare Center Locations

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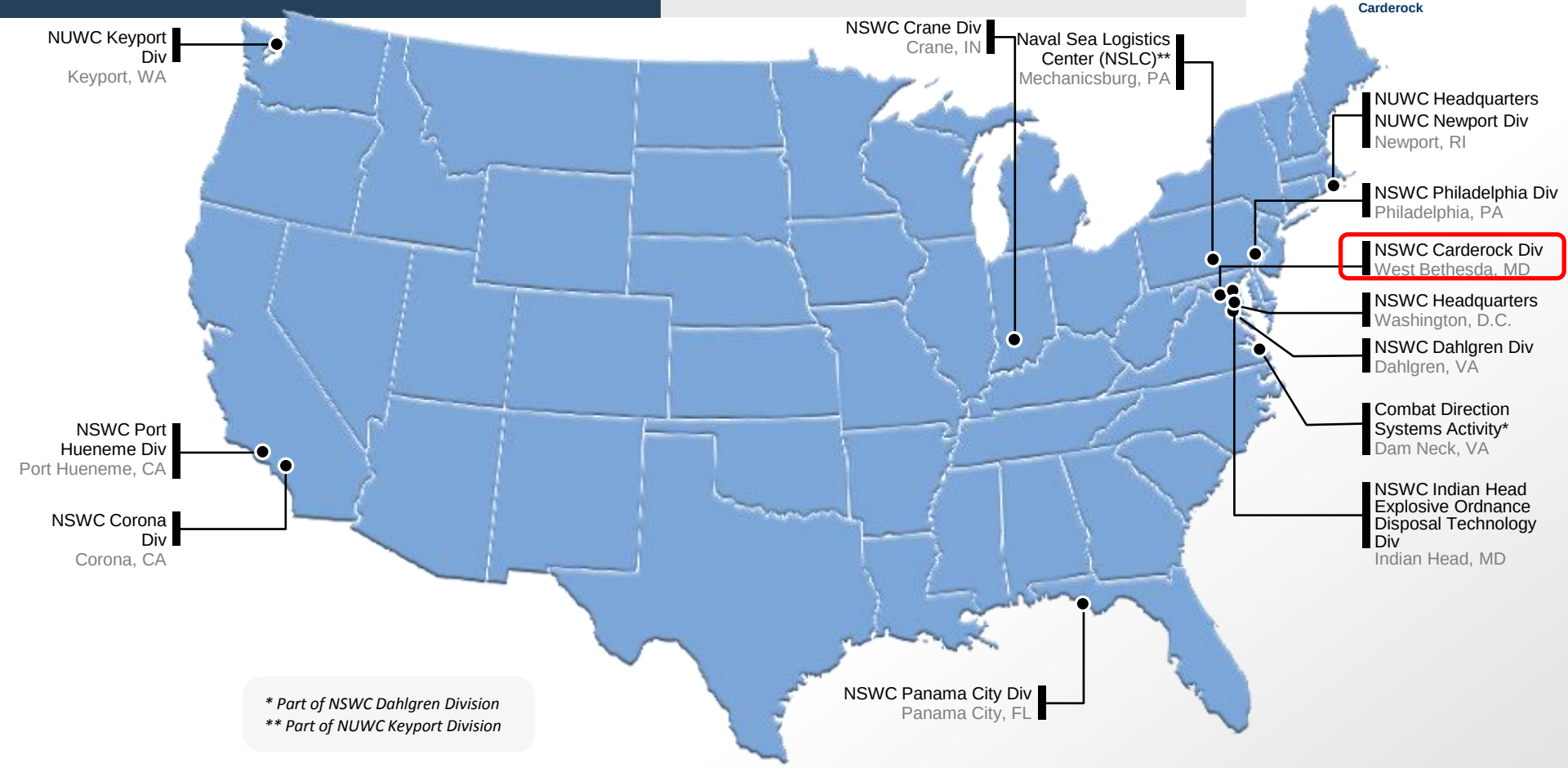

Warfare Center Quick Facts

- ~22,060 diverse and highly educated employees focused on innovation (~14,700 scientists, engineers, and technicians with ~600 Ph.D.s)
- 128 unique Technical Capabilities (TCs) across 10 Divisions
- Operates under the Navy Working Capital Fund (NWCF) business model
- Disciplined process for accepting and assigning the right work to the right WC Division based on TCs
- Part of the Naval Research & Development Establishment (NR&DE)
- Size of the workforce is based on the funded workload
- Performs work our industry partners can't, won't or shouldn't do.
- Maintains more than 164 unique RDT&E facilities

Naval Research & Development (NR&DE)

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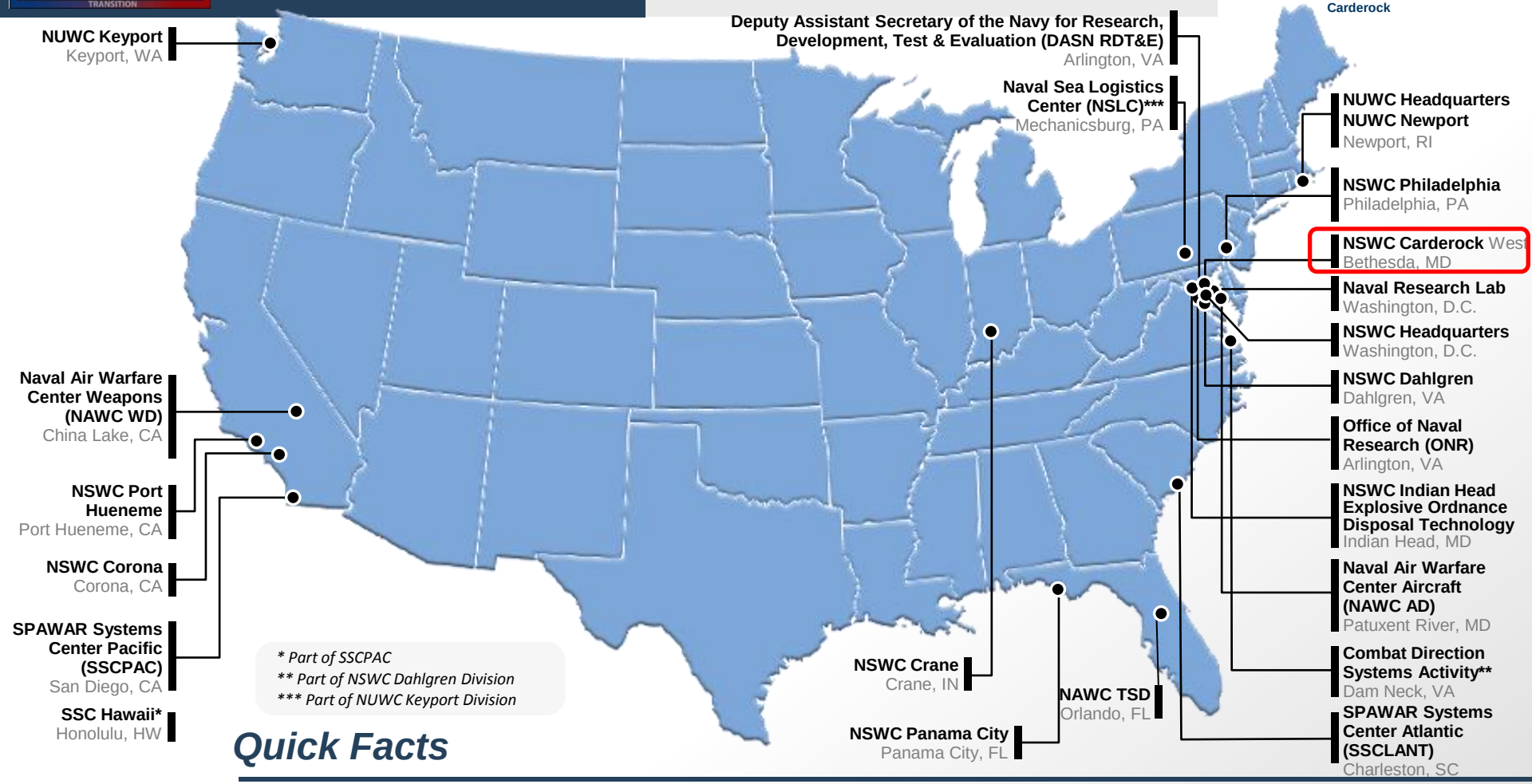

Quick Facts

- Diverse and highly educated workforce with 25,000 scientists, engineers, and technicians (with more than 2,000 Ph.D.s)
- 20 commands across the NAVAIR/NAVSEA Warfare Centers, SPAWAR Systems Centers, ONR and NRL
- Conducts RDT&E for the DoN to discover, develop, transition and field technologically superior naval warfighting capabilities.
- Unique Naval RDT&E facilities including laboratories, test facilities and test ranges
- Serves as principal R&D agents for Navy and Marine Corps Program Executive Offices
- Organizationally aligned to Naval Systems Commands and ONR
  - Naval Sea Systems Command (NSWCs, NUWCs)
  - Naval Air Systems Command (NAWCs)
  - Space and Naval Warfare Systems Command (SSCs)

Aggressive Research, Development, Test & Evaluation for reliable real world solutions.

Carderock Sites

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Where We Work

Acoustic Research Detachment
BAYVIEW • IDAHO

Southeast Alaska Acoustic Measurement Facility (SEAFAC)
KETCHIKAN • ALASKA

Carderock Division HEADQUARTERS
WEST BETHESDA • MARYLAND

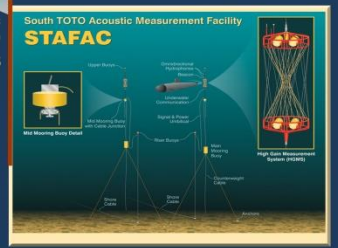
Puget Sound Detachment
at Naval Submarine Base Bangor
BANGOR • WASHINGTON

Norfolk Detachment
Combatant Craft Division
NORFOLK • VIRGINIA

Memphis Detachment
Dr. Wm. B. Morgan Large Cavitation Channel
MEMPHIS • TENNESSEE

South Florida Ocean Measurement Facility (SFOMF)
FT LAUDERDALE • FLORIDA

South TOTO Acoustic Measurement Facility (STAFC)
ANDROS ISLAND • BAHAMAS



Unique Facilities

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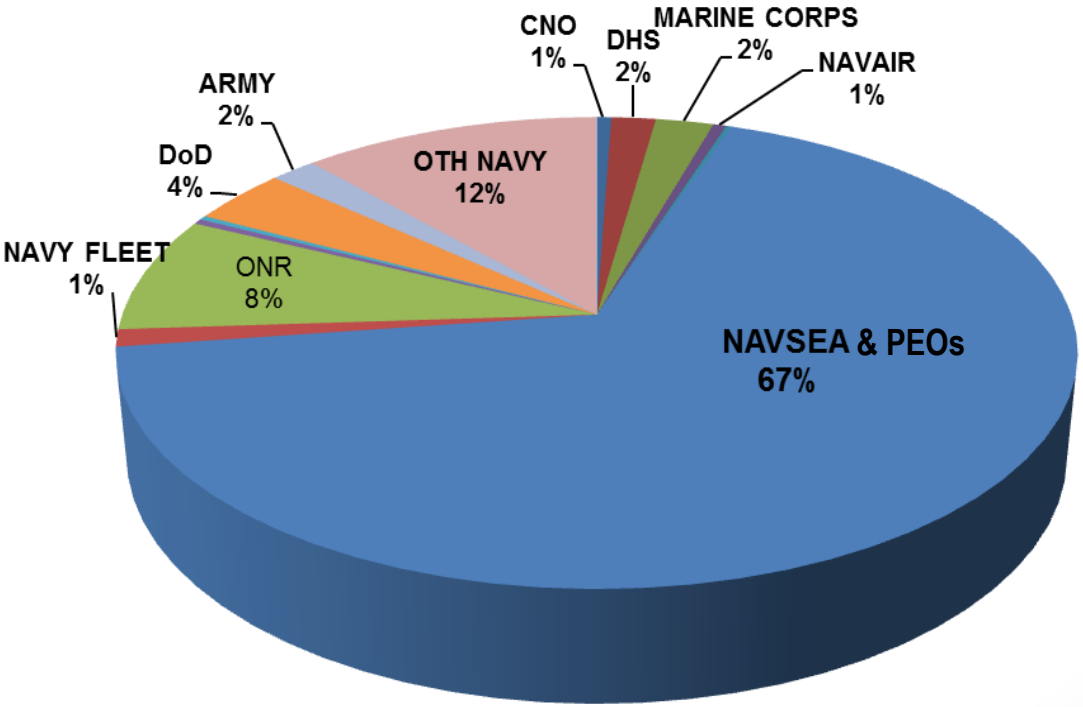
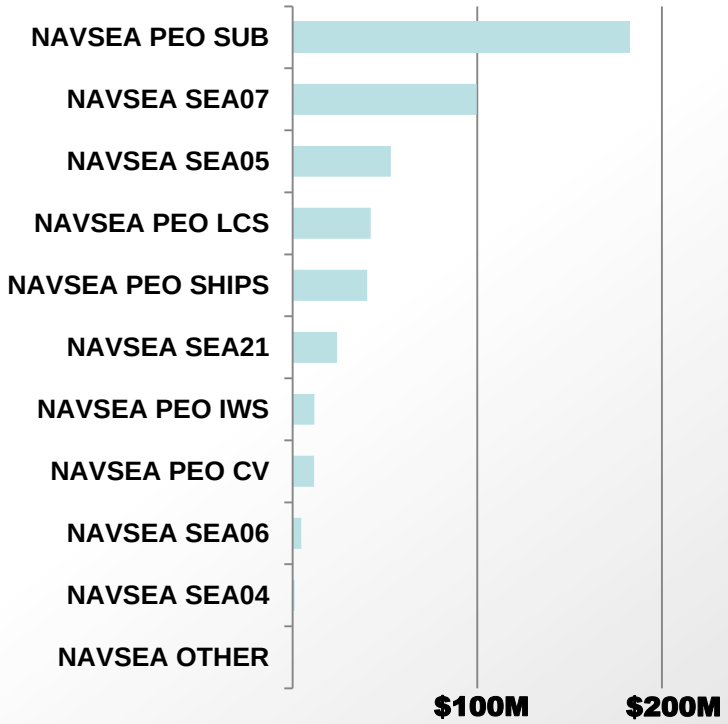
Major Customers & Budget





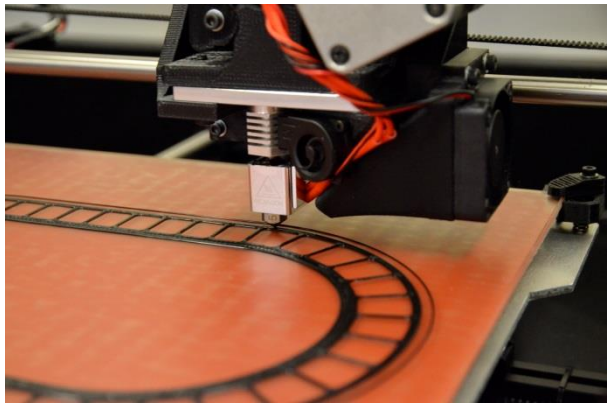
Business

Cost reimbursable and direct cite:

$765 Million

DIRECT LABOR	CONTRACTS
$495 Million	$270 Million

Technical Departments



Survivability, Structures, Materials and Environmental Department

Signatures Department

Naval Architecture and Engineering Department

Major Programs Supported

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- **Ohio-Class Replacement**

- **DDG 1000 / DDG 51**

- **Virginia-Class**

- **Carriers**

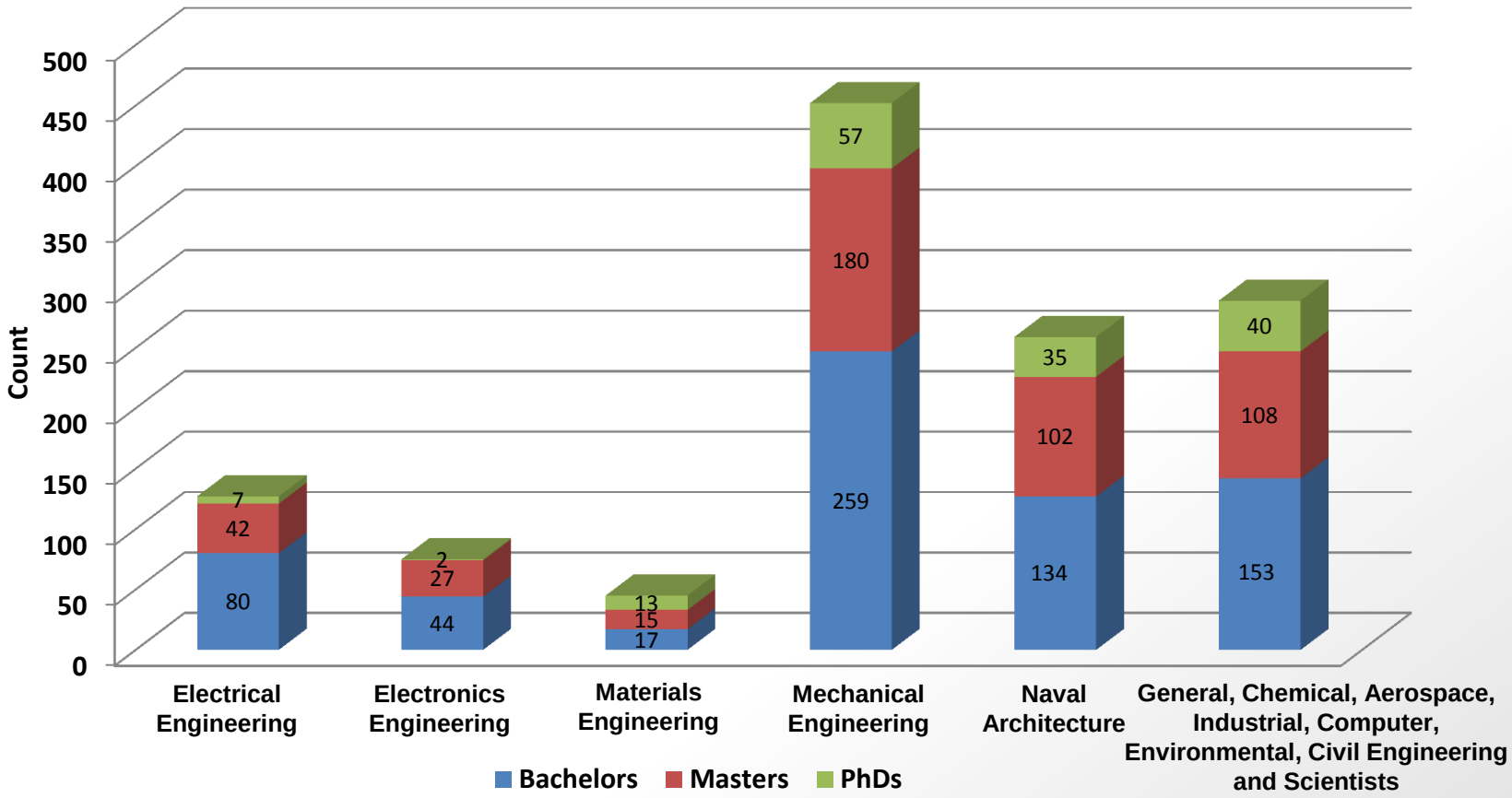
- **Littoral Combat Ships (both variants)**

- **Combatant Craft**

- **Amphibious and Auxiliary ships**

- **Unmanned Systems**

Our Workforce & Engineers



TOTAL EMPLOYEES	SCIENTISTS & ENGINEERS	EDUCATION		
		Bachelors	Masters	Doctorate
2,008	1,315	899	569	160

Naval Engineer Lifecycle

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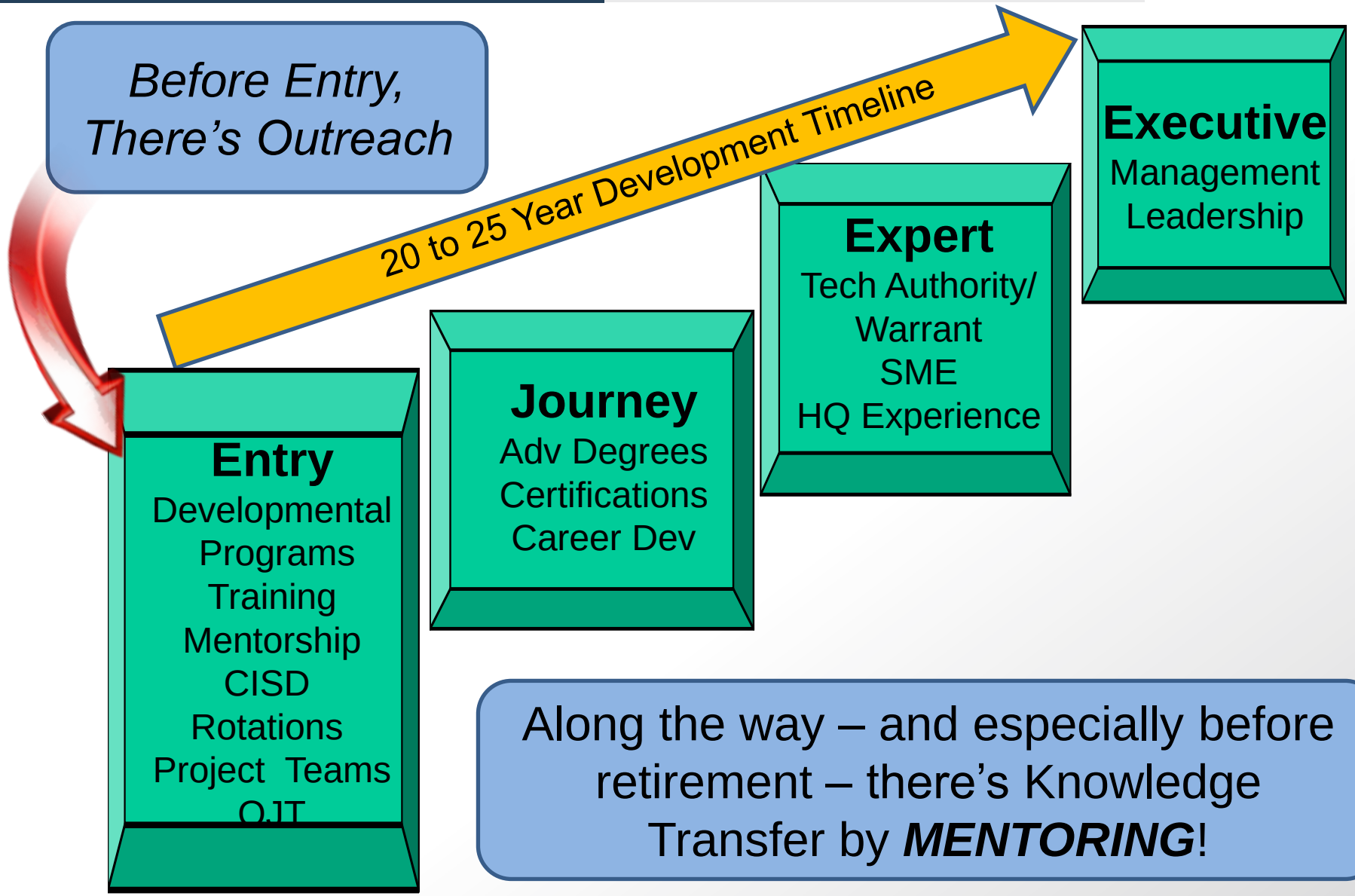
Before Entry, There's Outreach



Along the way – and especially before retirement – there's Knowledge Transfer by ***MENTORING***!

STEM & Outreach (FY15)

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Coordinated Educational Outreach Programs

- Summer faculty
- Student internships and volunteer programs
- Naval Engineering Education Consortium (NEEC)
- K-12: Sea Perch, MATHCOUNTS, FIRST Lego, Sea Glide, Sea Plane, calculator-controlled robots, field trips, summer STEM camps, Summer STEM teacher institutes

Impact

- 200 schools (MD, VA, DC, ID)
- 7,744 students (K-12)
- 8 Science, Mathematics and Research for Transformation (SMART) students
- 26 Summer faculty
- 101 Science and Engineering Apprenticeship Program (SEAP) students
- 122 Naval Research Enterprise Internship Program (NREIP) students
- 40 student volunteers

International Human-Powered Submarine Races

- Biennial event
  - 24 teams in 2015
  - 6 international

Innovation

Naval Innovation Science & Engineering (NISE)

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Catalyst for Innovation

- **NISE – Section 219 Funds**
  - Major innovation catalyst
  - Technical Director's Innovation Challenge; Disruptive Technology Lab; High-Energy Weapon integration; Additive Manufacturing (3D Printing); Power and Energy
- **Naval Research & Development Establishment Collaboration**
  - 28 WFC projects, 43 other DoD, 41 academia
- **FY16 - $7.9M**
- **39 Technical Papers Generated in FY15**
- **21 Conference or Society Papers in FY15**
- **18 advanced degrees in process in FY15 with 4 graduate degrees completed**

CRADAs – Research Partnerships

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FY15 Navy Patent of the Year

Principal investigator Phil Dudt and summer intern Dante Dobbins research the use of Elastomeric Armor for Combat Helmets to mitigate traumatic brain injury.

Experimental helmets incorporating this coating are being subjected to explosive blast. Output of pressure and acceleration sensors embedded in mannequins are analyzed to determine effectiveness. Findings showed coatings significantly decreased the intra-cranial impulse and acceleration linked to Traumatic Brain Injury.

Work is part of a CRADA between Carderock and DuPont Corporation. U.S. Navy photo by James Contreras.

- **Cooperative Research and Development Agreements (CRADA)**
- **With industry and academia**
- **88 active; 29 new in FY15**
- **Research areas include –**
  - Energy Storage
  - Energy Conversion (from currents and waves)
  - Sea Arctic Research ship
  - Situational Awareness
  - Additive Manufacturing
  - Deep Submergence Capabilities
  - and more

Summary

- **Support Our Deploying Forces**
- **Improving Acquisition Program Outcomes**
- **Cutting-edge Innovations**

We envision the future Fleet, create it and help sustain it.

NSWC Carderock Division –

Where the Fleet Begins